

## **REMARKS**

The Office Action dated March 13, 2003, has been received and carefully noted. The amendments made herein and the following remarks are submitting as a full and complete response thereto.

As a preliminary matter, Applicants appreciate the indication of allowable subject matter in claims 2, 3/2, 4/3/2 and 5/2 of the present application.

Claims 1 and 6 have been amended. New claims 7-10 have been added. Applicants submit that the new claims as well as the amendments are fully supported in the specification and the drawings as originally filed, and therefore no new matter has been added. Accordingly, claims 1-10 are pending in the present application and are respectfully submitted for consideration.

Claims 1, 3/1 and 6 were rejected under 35 U.S.C. § 102(b) as being anticipated by Pu (U.S. Patent No. 6,034,377). The Applicants respectfully submit that each of claims 1, 3/1 and 6 recites subject matter that is neither disclosed nor suggested by the prior art.

Claim 1 recites a charged-particle beam irradiator having a plurality of scan electromagnets provided on an entrance side of a final deflection eletromagnet to scan a charged-particle beam to expand an irradiation field. Kicks are provided by the plurality of the scan electromagnets and are superimposed to form a collimated irradiation field at an exit of said final deflection electromagnet.

Claim 6 recites a therapy system including a charged-particle beam irradiator. The charged-particle beam irradiator has a plurality of scan electromagnets provided on an entrance side of a final deflection electromagnet, configured such that kicks are

provided by the plurality of the scan electromagnets and are superimposed to form a collimated irradiation field at an exit of a final deflection electromagnet to irradiate an affected part with a charged-particle beam.

Accordingly, at least one of the essential features of the present invention is a charged-particle beam irradiator having a plurality of scan electromagnets provided on an entrance side of a final deflection electromagnet. As such, the present invention results in the advantage of providing a collimated irradiation field which maintains an irradiation zone at a constant area irrespective of depth of irradiation upon performing scan irradiation even with a high magnetic field being provided by a final deflection electromagnet.

Thus, it is respectfully submitted that the prior art fails to disclose or suggest the elements of the Applicants' invention as set forth in claims 1 and 6, and therefore fail to provide the advantages which are provided by the present application.

Pu discloses a charged particle beam irradiation apparatus and a method of irradiation with charged particle beam. Fig. 7 of Pu discloses a charge particle beam 31 emitted with a predetermined beam energy  $E_0$  (65) and is bent by a predetermined angle by the scanning electromagnet 33, and is bent by the same angle in the opposite direction by the scanning electromagnet 35 which produces a magnetic field in the opposite direction, wherein the strength and length of magnetic field are the same as the scanning electromagnet 33. Then, the charged particle beam 31 of Pu is passed through the energy modulator 40 and the energy degrader 21 and transformed into a beam parallel to the original charged particle beam 31, which irradiates an irradiated object 57.

Applicants respectfully submit that each and every element recited within claims 1 and 6 is neither disclosed nor suggested by Pu. In particular, Applicants submit that the charged-particle beam irradiator as well as the therapy system having a charged-particle beam irradiator, as recited in the present application is clearly distinct from that which is illustrated by the cited prior art. Specifically, Applicants submit that the placement or the positioning of the scanning electromagnets 33 and 35 of Pu is distinguishable from the claimed invention. As mentioned above, the scanning electromagnets 33 and 35 of Pu are located at the exit side of the third deflection electromagnet 19 (see Fig. 5),. In contrast, the present invention recites "a plurality of scan electromagnets [are] provided on the entrance side of a final deflection electromagnet". Accordingly, Applicants respectfully submit that Pu fails to disclose or suggest each and every element recited within claims 1 and 6 of the present invention.

As for claim 3/1, Applicants submit that this claim also recites subject matter which is neither disclosed nor suggested in the cited prior art. In particular, claim 3/1 depends from claim 1. Therefore, claim 3/1 incorporates each and every limitation recited within claim 1 therein. Accordingly, Applicants respectfully submit that claim 3/1 also recites subject matter that is neither disclosed nor suggested by Pu, for at least the reasons set forth above with respect to claim 1.

Claims 4 and 5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Pu in view of Akiyama et al. (U.S. Patent No. 6,218,675 hereinafter "Akiyama"). In making this rejection, the Office Action took the position that Pu disclosed each and every element reciting the claimed invention with the exception of showing a plurality of scan electromagnet disposed upstream from the deflection at an entrance thereof, and

a plurality of scan electromagnets are disposed independent of each other in the X and Y directions. The Office Action cited Akiyama for curing the deficiencies which exist in Pu. Applicants respectfully submit that each of claims 4 and 5 recite subject matter that is neither disclosed nor suggested by the cited prior art.

Pu has been characterized above.

Akiyama discloses a charged particle beam irradiation apparatus. Fig. 1 of Akiyama discloses a scanning electromagnet 100 provided between quadrupole electromagnets 3 and 4, and a scanning electromagnet 110 provided in the irradiation nozzle 40 downstream of the bending electromagnet 8. The scanning electromagnet 100 is an electromagnet for deflecting the beam in a direction parallel to the deflection plane (X-Z plane shown in Fig. 1) created by the bending electromagnets 6, 7 and 8, and generates a magnetic field in the Y direction, perpendicular to the deflection plane created by the bending electromagnets 6, 7 and 8. The scanning electromagnet 110 is an electromagnet for deflecting the beam in the Y direction, perpendicular to the deflection plane caused by the bending electromagnets 6, 7 and 8, and generates a magnetic field in the direction parallel to the deflecting plane.

Applicants respectfully submit that each and every element recited within claims 4 and 5 is neither disclosed nor suggested by Pu and/or Akiyama, taken on loan or in combination. In particular, claims 4 and 5 are dependent on independent claim 1. Accordingly, each and every limitation recited within claim 1 is also recited within claims 4 and 5, and therefore the limitation of "a plurality of scan electromagnets provided on an entrance side of a final deflection electromagnet" is also recited within claims 4 and 5 of the present application under 35 U.S.C. § 112, fourth paragraph. Applicants

respectfully submit that Akiyama fails to disclose or suggest that above limitation, and thus fails to cure the deficiencies which exist in Pu. Therefore, Applicants submit that each of claims 4 and 5 also recite subject matter that is neither disclosed nor suggested by Pu and/or Akiyama, taken alone or in combination.

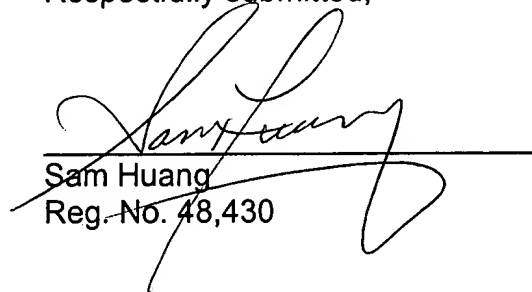
As for new claims 7-10, Applicants respectfully submit that each and every element recited within these claims is neither disclosed nor suggested by the cited prior art. In particular, independent claim 7 is formerly dependent claim 2 re-presented in independent form including the already determined allowable subject matter of claim 2. Accordingly, it is submitted that claim 7 contains allowable subject matter, and therefore should be allowed. As for claims 8-10, each of these claims depends from independent claim 7. Therefore, each of claim 8-10 incorporates at least the allowable subject matter recited within claim 7 therein. Accordingly, Applicants respectfully submit that each of claims 8-10 also recite the allowable subject matter that is neither disclosed nor suggested by the cited prior art, and therefore should also be allowed.

In view of the above, Applicants respectfully submit that claims 1-10 each recites subject matter that is neither disclosed nor suggested in the cited prior art. Applicants also submit that the subject matter is more than sufficient to render the claims non-obvious to a person of ordinary skill in the art, and therefore respectfully request that claims 1-10 be found allowable and that this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact the Applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees which may be due with respect to this paper, may be charged to Counsel's Deposit Account No. 01-2300, **referencing docket number 107292-00023.**

Respectfully submitted,



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